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(54) **Digital display control**

(57) The invention relates to the ability to receive data from a remote source which is transmitted to a broadcast data receiver at a location for use. The data which is transmitted includes at least video data which is used in the generation of a television programme and/or other material which is displayed on screen. A user is provided with a control means or control capability to freeze or stop the video display at a particular frame on screen and, when the display is stopped, select a portion of the display on screen. The data for the selected portion is identified by the broadcast data receiver or by apparatus connected to the receiver and processed to develop a new on-screen display for the selected portion only and to a scale which is either pre-defined or selected by the user. In addition, algorithms may be used in the reprocessing of the data for the selected portion to allow the display which is generated to have improved image characteristics.

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## Description

[0001] The invention to which this application relates is a means and system of allowing the manipulation of an element or portion of a visual display of a type which is viewed on a display screen, typically, but not exclusively, on a television set or monitor and relates to a broadcast television programme.

[0002] The broadcast of television programmes can now be performed in many different manners such as via satellite transmission, terrestrial transmission or cable transmission. In each case the transmission of the data for the broadcast and other services relating to television programmes is improved by using digital data and the processing of the data in a digital form and this method and system is increasingly used throughout the world. In these systems a broadcast data receiver is typically provided as a device to be connected to the television or monitor screen or as a device which is provided as an integral part of the screen apparatus. In either case, the receiver receives the transmitted digital data, decodes the data and generates a series of frames of video data for display on the television or monitor screen.

[0003] The provision of the broadcast data receiver allows the viewer to control certain features of the visual display and it is to the ability to control the display to which this patent application is directed.

[0004] It is known to be able to control displays of video cameras or close circuit television systems to cause the cameras to "zoom" in on specific features but it is not known to allow a viewer of a display, which is generated as a result of processing data transmitted from and controlled by a remote source, to select a portion of that display for redisplay at a different scale factor. Thus the generation of a display from a portion of an existing display which is generated as a result of data from a source located elsewhere and independently of that source is not currently known as, at present, all processing to provide a "zoom" facility takes place at the location at which the data for the first display is generated and so the data can be altered at the same and not a remote location.

[0005] It is an aim of the invention to allow a viewer to select a portion of a television broadcast video display and generate a view of the same which is of greater, or lesser scale than the portion when originally displayed and importantly to allow the generation of the same with improved visual characteristics.

[0006] In a first aspect of the invention there is provided a system for generating a display on a television or monitor screen, said system comprising the steps of;

generating a first screen display via a broadcast data receiver resulting from the processing and decoding of digital data including video content received from a remote source;  
the viewer selecting, by the use of control means, to

freeze the display;

selecting, via the control means, at least a portion of the display, and identifying and reprocessing the data for the selected portion to generate an on screen display of the selected portion to a designated scale.

[0007] Typically the identification and reprocessing of the appropriate data takes place within the broadcast data receiver.

[0008] In one embodiment the designated scale is selected by the viewer from a series of options which can be displayed on screen in one embodiment, or alternatively, can be any scale selectable by the viewer or alternatively is selected by the broadcast data receiver processing means to provide the best fit of the selected portion on the display screen.

[0009] In one embodiment the processing means need not be an integral part of the receiver but can be connected thereto and/or to the television or monitor screen.

[0010] In one embodiment of the system, once the portion of the "frozen" display has been selected by the viewer, the portion is resized to match the existing aspect ratio of the display and the resized portion is processed using image processing algorithms to enhance the detail of the selected portion followed by the mapping of the image to a "full sized" image buffer in the apparatus equivalent to the screen display prior to display.

[0011] The image processing algorithms which are used can be any or any combination of convolution filtering, edge detection, digital image transforms and region segmentation and shape analysis algorithms.

[0012] The use of the system in accordance with the invention allows, in a preferred embodiment, for the enhancement of the quality of the display of the selected portion which is to be shown. Thus, and as is expected to be the case in most instances, the selection of a portion of the display for subsequent display at a larger scale, leads to that portion being processed using algorithms in order to enhance the images so as to improve the definition and detail of the same within that portion. This means that rather than simply altering the scale of the display which may result in a poor quality display, the system in accordance with the present invention preferably includes the processing step of enhancing the images by reprocessing the data received for that portion to improve the appearance and distinctiveness of the images in the selected portion. This can generate a display which is at the required scale and is also of improved quality.

[0013] Specific examples of the invention can now be described with reference to the accompanying drawings; wherein

Figure 1 illustrates a display on a television or monitor screen in normal form and the selection of a

portion of the same;

Figure 2 illustrates a display of the selected portion from Figure 1 in accordance with the invention.

**[0014]** Referring firstly to Figure 1 there is illustrated a display 2 which is generated on a television screen 4. The television is connected to a broadcast data receiver 6 hereinafter referred to as a receiver. The receiver 6 is provided to receive digital data via satellite, cable or terrestrial broadcast systems and which data is decoded by the receiver and includes video, audio and auxiliary data which is used to generate a video display on the screen and audio and teletext or other services as required. The video display comprises a series of successive frames of video generated from the digital data received.

**[0015]** A viewer who views the display may from time to time wish to look at a portion of the display in more detail for a variety of reasons which can include, for example, to ascertain whether in a football match the football crosses the goal line and causes a goal to be scored or not, or, as is illustrated in the accompanying Figures, to allow certain faces in a display of a crowd of people to be studied more clearly.

**[0016]** Referring to Figure 1 there is shown a display comprising a crowd of people 10 as is illustrated. A viewer may know that a certain person is in the crowd or may wish to look at a person or persons in the crowd in more detail. The viewer can be provided with the means as is, for example, described in the applicant's co-pending Patent Application No.GB9900333.7, to freeze the display so that a particular frame remains on screen and the display is not updated or changed. In this condition the viewer can then use a control means which can be of any standard type, such as a computer mouse, or remote control device, to select a portion of the display which is of interest to them by using an outline box which is displayed on screen 14 as indicated.

**[0017]** Having selected the portion the viewer can then select the scale factor to which the selected portion is to be displayed, at random, or from a series of scale factor options, or the receiver may be pre-programmed to change the selected portion to a scale factor to provide the best fit of the selected portion across the display screen 4.

**[0018]** In any case, the receiver processing means then accesses the data from which the selected portion was initially generated and which will be held in a memory in the receiver and then reprocesses the data to allow the portion to be resized to the aspect ratio of the display and uses any or any combination of image processing algorithms as previously mentioned as being an important feature of a practical embodiment of the invention. The use of these algorithms in the reprocessing can cause the images in the selected portion to be enhanced and be more easily identifiable. When this processing step is completed, the display of the

selected portion is generated at the required scale factor on the display screen as shown in Figure 2 which then allows the viewer to look at the display of the portion at a larger, or smaller, scale as they require.

**[0019]** It is envisaged that the processing of the selected area is best performed by the receiver processing means. It is envisaged that to allow the system of the invention to be performed, an extra processing layer in the video graphics processor will be required in comparison to the conventional receiver video graphics processor. The computational power required to allow the algorithms to be used to process the selected display portion can be accommodated within the processing functions of the receiver without noticeable delays and thus allows the processing of the selected portion to take place in real time in accordance with the viewers received instructions.

**[0020]** Thus the present invention provides the ability to the viewer to select from a video display generated via broadcast transmitted data, a portion of the display at any instant and to select to display that portion at a different scale to that at which it was originally displayed, so that a portion which may have occupied a relatively small part of the original display can be selected to be displayed over the entire display screen. Furthermore the use of the image processing of the selected portion prior to the display of the same allows for the enhancement of the portion so that the features in the portion can be more distinctive and or distinguishable to the viewer when displayed.

#### Claims

1. A system for generating a display on a television or monitor screen, said system comprising the steps of;

generating a first screen display via a broadcast data receiver resulting from the processing and decoding of digital data including video content received from a remote source;  
the viewer of the screen display selecting, by the use of control means, to freeze the display;  
selecting, via the control means, at least a portion of the display, and identifying and reprocessing the data for the selected portion to generate an on screen display of the selected portion to a designated scale.

2. A system according to claim 1 wherein the identification and reprocessing of the appropriate data takes place within the broadcast data receiver.
3. A system according to claim 1 wherein the scale of the selected portion display is selected by the user from any of a series of options displayed on screen.
4. A system according to claim 1 characterised in that

the designated scale is input by the viewer via the control means.

5. A system according to claim 1 wherein the designated scale is selected by the receiver processing means to provide the best fit of the selected portion on the display screen. 5
6. A system according to claim 1 wherein the processing means to process the on-screen display for the selected portion is connected to the receiver and/or the television or display screen. 10
7. A system according to claim 1 wherein once the display portion has been selected by the viewer, the portion is re-sized to match the existing aspect ratio of the display and the re-sized portion is processed using one or a range of image processing algorithms to visually enhance the selected portion followed by the mapping of the image to a full size image buffer in the receiver prior to the display of the reprocessed display. 15 20
8. A system according to claim 7 wherein the image processing algorithms used can be any or any combination of convolution filtering, edge detection, digital image transforms, region segmentation and shape analysis algorithms. 25

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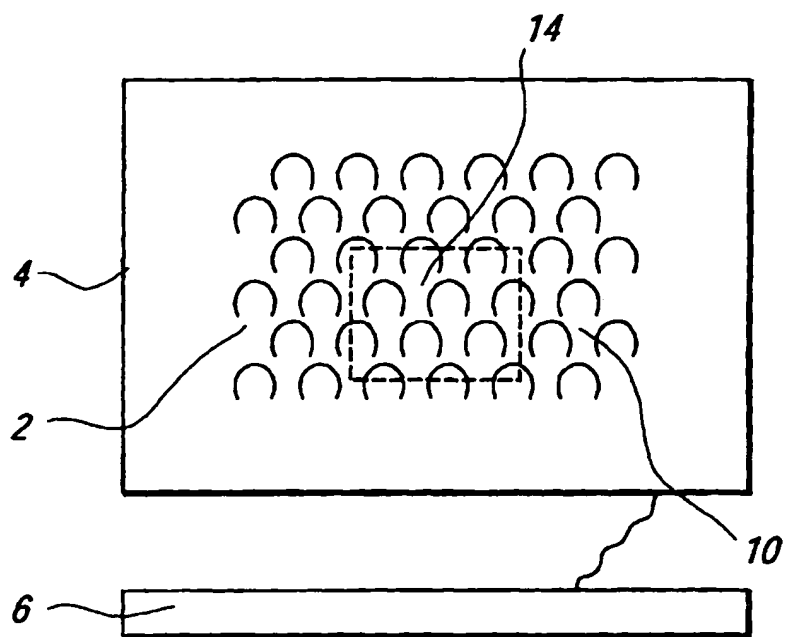


FIG. 1

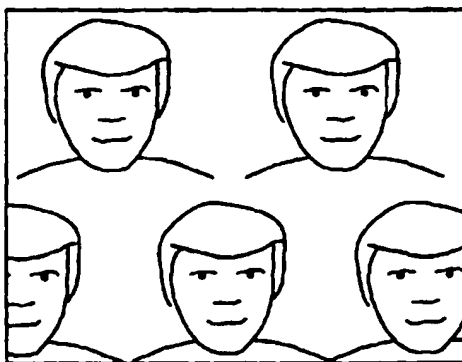


FIG. 2



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# EUROPEAN SEARCH REPORT

Application Number  
EP 00 30 3059

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 5 610 653 A (ABECASSIS MAX) 11 March 1997 (1997-03-11)	1-4	G06T3/40
Y	* column 1, line 39 - line 43 * * column 34, line 56 - column 35, line 9 * * column 39, line 51 - line 65 * * column 41, line 6 - column 44, line 27; figures 9-11A *	5-8	
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)  H04N G06T
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>8 August 2000</b>	Examiner <b>Yvonnet, J</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 00 30 3059

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08-08-2000

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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